

# PATENT ABSTRACTS OF JAPAN

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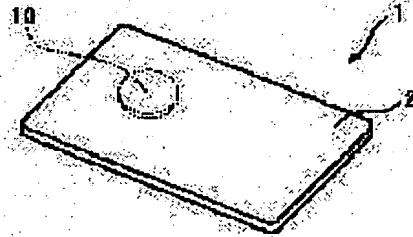
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## (54) NONCONTACT TYPE IC CARD

### (57) Abstract:

**PROBLEM TO BE SOLVED:** To form a noncontact type IC card that can prevent the occurrence of warpage with all possible manners in an IC card having a module package buried in the card main body.

**SOLUTION:** This card is composed of a center sheet 3 with a module hole 3a made therein, a pair of heat weldable cover sheets 4a, 4b formed by being connected on both the surfaces of the center sheet 3 and of the same thickness and material, and a module package 10 sealed in the module hole 3a of the center sheet 3 with the cover sheets 4a, 4b and having electric parts such as antenna coils sealed with resin and formed into a flat coil in its both surfaces.



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## LEGAL STATUS

[Date of request for examination]

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[Kind of final disposal of application other than the examiner's decision of rejection or

*Symmetrical  
thickness  
card*

## NONCONTACT TYPE IC CARD

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### International Class (IPC Edition 6):

- B42D-015/10
- G06K-019/07
- G06K-019/077

### JAPIO Class:

- 30.1 (MISCELLANEOUS GOODS--- Office Supplies)
- 14.2 (ORGANIC CHEMISTRY--- High Polymer Molecular Compounds)
- 45.3 (INFORMATION PROCESSING--- Input Output Units)

### JAPIO Keywords:

- R044 (CHEMISTRY--- Photosensitive Resins)
- R124 (CHEMISTRY--- Epoxy Resins)
- R303

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### JAPIO

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]****[0001]**

**[Field of the Invention]** This invention relates to the noncontact IC card which performs the communication link with a reader etc. in the non-contact condition.

**[0002]**

**[Description of the Prior Art]** In recent years, the IC card which mounted the semiconductor device which performs record of data and processing is spreading from the increase in efficiency of information processing, or a viewpoint of security. And recently, the semiconductor device for the antenna coil which transmits and receives data by the electromagnetic wave, and data processing is built in, and the noncontact IC card which can realize R/W of the data between external processors with the so-called radio system is developed.

**[0003]** The manufacture approach that they do not expose a module to a card face from the cure against static electricity or an exterior viewpoint since the configuration of an antenna of a non-contact module is various by the communication frequency or the function including antenna coil and these noncontact IC cards do not need a contact terminal still like an IC card is usually searched for.

**[0004]** For example, as shown in drawing 4 , a crevice is formed in the approach of putting the module 100 which unified antenna coil and IC module arranged on the outside with the sheet made of resin, or a resin sheet by sedentary reeling \*\*\*\*, a crevice is equipped with a module 100, and there is the approach of putting a resin sheet further and joining.

**[0005]** Thus, when manufacturing a card by the method which a module does not expose to a card face, irregularity is reflected in the card face of a part under which the module package is laid as modular thickness is thick and irregularity is remarkable as it is, and a poor appearance occurs. In order to abolish such a poor appearance, as shown in drawing 5 , on a substrate, it mounts and the modularization of the external components, such as a semiconductor device, a coil, a capacitor, and a cell, is carried out, a module is closed by resin, such as an epoxy resin, if needed, the module package 200 of a coin mold is manufactured, and fixed form processing (smoothing) is performed. An adhesive film 201 is made for this module package to intervene, and there is the approach of carrying out heat adhesion processing, or joining a cover sheet directly by heat lamination, and card-izing the cover sheets 202, such as PVC, ABS, or a PET film.

**[0006]**

**[Problem(s) to be Solved by the Invention]** However, when joining a cover sheet to a pin center, large sheet by heat lamination in this way, on the obtained card, the curvature considered to be generated from a difference to the thermal conductivity of a card base material and a module package and the rate of a heat shrink may arise. With the card of the specification of thickness that thickness is 0.76mm, the thickness of the cover sheet by which thermal melting arrival is carried out to a pin center, large sheet is about 100-200 micrometers, and the problem that curvature is remarkable especially has it.

**[0007]** This invention was made in view of the above-mentioned situation, and aims at offering the noncontact IC card which can prevent generating of the curvature in the IC card which lays a module

package under the card base material as much as possible.

[0008]

[Means for Solving the Problem] The pin center, large sheet with which the module hole was drilled in order that this invention might attain the above-mentioned purpose. The cover sheet of the thermal melting arrival nature of the pair which was joined by both sides of this pin center, large sheet with a heat press, and consisted of same thickness and quality of the materials, It is enclosed by the above-mentioned cover sheet in the module hole of the above-mentioned pin center, large sheet, and the noncontact IC card which has the module package with which electronic parts, such as IC and antenna coil, were closed by resin, and both sides were formed in the shape of [ flat ] coin is offered.

[0009] As for the noncontact IC card of this invention, thermal melting arrival of the cover sheet of the pair by which lamination was constituted from the same thickness as both sides and the same ingredient of a pin center, large sheet centering on the pin center, large sheet is carried out. And the module package with which the closure of the IC etc. was carried out and the data of it etc. was smoothed in the shape of coin is enclosed in the module hole drilled by the pin center, large sheet.

[0010] When such lamination thinks centering on a module package, in case it is symmetrical, thermal melting arrival of the cover sheet of thermal melting arrival nature is carried out to a pin center, large sheet and a card base material is formed to the thickness direction, a pin center, large sheet and a module package are heated from both sides through a cover sheet. Even if there is a difference between coefficient of linear expansion, the rate of a heat shrink, and the heat conductivity in a cover sheet and a module package at this time, these differences are produced by both sides of a module package, and since extent to produce is the same amount by both sides of a module package, a possibility that curvature may produce these differences in phase murder and a card base material mutually decreases.

[0011] Moreover, when thickness is the IC card of the specification which is 0.76mm, for example and it is such symmetrical lamination, since two cover sheets are required, the thickness of the cover sheet of one sheet becomes thin with about 100-200 micrometers, and a possibility that curvature may arise without a difference of coefficient of linear expansion with the above-mentioned module package, the rate of a heat shrink, and thermal conductivity being unabsorbable in reinforcement becomes high. However, even if a cover sheet is thin, it is hard to produce curvature by considering as the symmetrical layer structure concerning this invention mentioned above.

[0012] In addition, in this specification, a thing with the breadth of extent substantially of being the same for preventing strictly not semantics but the curvature of being the same is included with the same or same thickness or the quality of the material.

[0013]

[Embodiment of the Invention] Hereafter, although the gestalt of operation of this invention is explained concretely, this invention is not limited to the gestalt of the following operation. Drawing 1 is the perspective view showing the IC card concerning this invention. The endocyst of the module package 10 of the shape of coin which closed IC module etc. is carried out to the card base material 2 of a card mold, and this IC card 1 can realize R/W of an external device and data with the so-called radio system by non-contact. In order to avoid the bending stress of a card, as for the laying-under-the-ground location of the module package 10, it is desirable that it can shift from the core of the cross direction of a card to an edge side.

[0014] As shown in drawing 2 (a), as for manufacture of this IC card 1, thickness drills module hole 3a in the pin center, large sheet 3 made of resin which is about 400-600 micrometers by punching. On the other hand, antenna coil, IC module, etc. are closed with an epoxy resin or ultraviolet-rays hardening resin, a vertical side is made the shape of coin in Taira and others, and the module package 10 of module hole 3a of the pin center, large sheet 3 and the abbreviation isomorphism said dimension same thickness is manufactured. Thickness puts the pin center, large sheet 3 which is about 400-600 micrometers on cover sheet 4a which is one made of thermal melting arrival resin whose thickness is 100-200mm. Module hole 3a of the pin center, large sheet 3 is equipped with the module package 10. Exaggerated sheet 4b of the same thickness, for example, 100-200mm thermal melting arrival resin, is put on the pin center, large sheet 3 with cover sheet 4a and this ingredient which have thickness under the pin

center,large sheet 3. For example, carry out a heat press on the pressure of 25kg/cm<sup>2</sup>, 150 degrees C, and the conditions for 15 minutes, and the pin center,large sheet 3 and cover sheets 4a and 4b are joined by heat joining. The module package 10 is enclosed into the card base material 2 which consists of a pin center,large sheet 3 and exaggerated sheets 4a and 4b of the both sides. It is possible to manufacture the noncontact IC card of the specification whose thickness is 0.76mm with the combination of such the pin center,large sheet 3 and cover sheets 4a and 4b.

[0015] Thus, the cross-section structure of manufactured IC card 1a is shown in drawing 2 (b). As shown in drawing 2 (b), by laminating the exaggerated sheets 4a and 4b of the same thickness to both sides of the pin center,large sheet 3 with the same quality of the material, the lamination of the card base material 2 in the part of the module package 10 becomes symmetrical in the thickness direction, as mentioned above, with the heat at the time of thermal melting arrival etc., it is hard to produce camber, deformation, etc. and they become.

[0016] An example of the unsymmetrical cross-section structure of the conventional IC card is shown in drawing 6 . This IC card 300 equips with the module package 310 that crevice 301 of the pin center,large sheet 303 in which the crevice 301 which embeds the module package 310 by sedentary reeling \*\*\*\*\* etc. was formed, and has the structure which carried out heat adhesion of a cover sheet or the exaggerated sheet 304 to both sides of the pin center,large sheet 303. Curvature will produce the lamination of this IC card into the part shown by the arrow head with the pressure and heat at the time of thermal melting arrival by the part including the module package 310, by the part without the module package 310, rather than card symmetrical to the module package 310 although it was symmetrical in the thickness direction.

[0017] As resin which constitutes the pin center,large sheet 3 concerning this invention, and a cover sheet 4, if it is thermal melting arrival nature, there is no limit, for example, it can illustrate polyvinyl chloride resin, polyethylene, polypropylene, polystyrene, ABS plastics, acrylic resin, polyester resin, polyamide resin, polyimide resin, etc.

[0018] Moreover, since the method which forms module hole 3a by punching etc. is adopted as the pin center,large sheet 3 with this operation gestalt, it is more advantageous than sedentary reeling \*\*\*\*\* with the inclination to become cost quantity for the breakage at the time of the press by module positioning mistake, and sedentary reeling \*\*\*\*\*, in cost.

[0019] Moreover, the IC card shown in drawing 1 can consist of components as shown in drawing 3 . As shown in drawing 3 (a), as for manufacture of this IC card 1b, thickness drills module hole 3a in the pin center,large sheet 3 made of resin which is about 400-600 micrometers by punching. On the other hand, antenna coil, IC module, etc. are closed with an epoxy resin or ultraviolet-rays hardening resin, a vertical side is made the shape of coin in Taira and others, and the module package 10 of module hole 3a of the pin center,large sheet 3 and the abbreviation isomorphism said dimension same thickness is manufactured. For example, on exaggerated sheet 5a of thermal melting arrival nature with a transparent thickness of about 50 micrometers Cover sheet 4a by which printing etc. is formed in the front face by the product made of resin of the thermal melting arrival nature whose thickness is 100-200mm is piled up. the module package 10 -- module hole 3a of a pin center,large sheet -- equipping -- exaggerated sheet 4b of the same quality of the material as the above-mentioned exaggerated sheet 4a, and thickness, and the quality-of-the-material \*\*\*\* same on it as the above-mentioned exaggerated sheet 5a -- exaggerated sheet 5b with the same transparent thickness is piled up. It is in the condition which piled up these five sheets, for example, a heat press is carried out on the pressure of 25kg/cm<sup>2</sup>, 150 degrees C, and the conditions for 15 minutes, the pin center,large sheet 3, cover sheets 4a and 4b, and the exaggerated sheets 5a and 5b are joined by heat joining, and the module package 10 is enclosed into card base material 2b which consists of a pin center,large sheet 3, cover sheets 4a and 4b of the both sides, and exaggerated sheets 5a and 5b. It is possible to manufacture the noncontact IC card of the specification whose thickness is 0.76mm with combination with such a pin center,large sheet, a cover sheet, and an exaggerated sheet.

[0020] As the quality of the material of the exaggerated sheets 5a and 5b, the same ingredient as a cover sheet 4 can be illustrated. Thus, the cross-section structure of manufactured IC card 1b is shown in

drawing 3 (b). As shown in drawing 3 (b), lamination becomes symmetrical in the thickness direction considering the module package 10 as a core, and it is hard coming to generate camber, deformation, etc. with the heat at the time of thermal melting arrival etc. by laminating the cover sheets 4a and 4b and the exaggerated sheets 5a and 5b of the same thickness to both sides of the pin center, large sheet 3 with the same quality of the material.

[0021] In the above-mentioned mode, although the card base material 2 is constituted at three sheets or five sheets, if other numbers of lamination of the lamination of the thickness direction is also still more nearly symmetrical, it will not interfere at all. This invention is not limited to the above-mentioned mode. For example, in the above-mentioned mode, although considered as the shape of coin of a disk form, as long as a module package can graduate a both-ends side, the configuration of square plate-like and others is sufficient as it.

[0022]

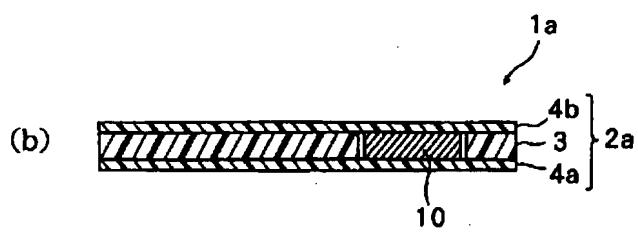
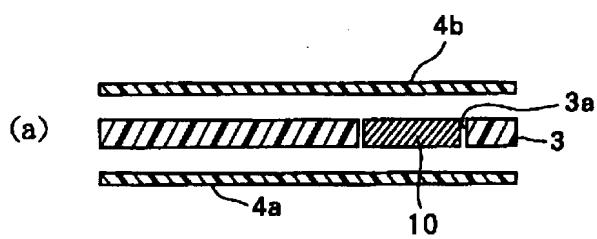
[Effect of the Invention] The noncontact IC card of this invention is the lamination structure of thermal melting arrival, and is the structure which the curvature at the time of thermal melting arrival cannot produce easily.

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[Translation done.]

Drawing selection  Representative drawing

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[Translation done.]

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] The noncontact IC card which is joined to the pin center, large sheet with which the module hole was drilled by both sides of this pin center, large sheet with a heat press, and has the module package with which it was enclosed by the above-mentioned cover sheet in the module hole of the same thickness, the cover sheet of the thermal melting arrival nature of the pair which consisted of the quality of the materials, and the above-mentioned pin center, large sheet, electronic parts, such as IC and antenna coil, were closed by resin, and both sides were formed in the shape of [ flat ] coin.

[Claim 2] The noncontact IC card according to claim 1 whose thickness of a cover sheet is 100-200 micrometers.

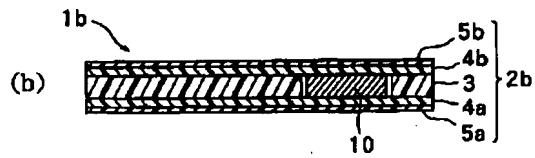
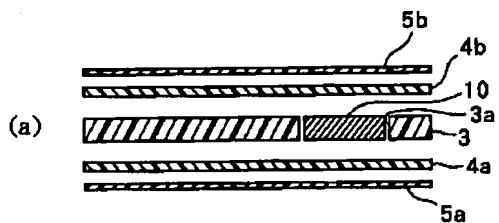
[Claim 3] The noncontact IC card according to claim 1 with which thermal melting arrival of the exaggerated sheet of the thermal melting arrival nature of the pair which consisted of the same quality of the materials as the same thickness as each cover sheet front face of both by which thermal melting arrival was carried out to the pin center, large sheet is carried out, respectively.

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[Translation done.]

Drawing selection drawing 3 

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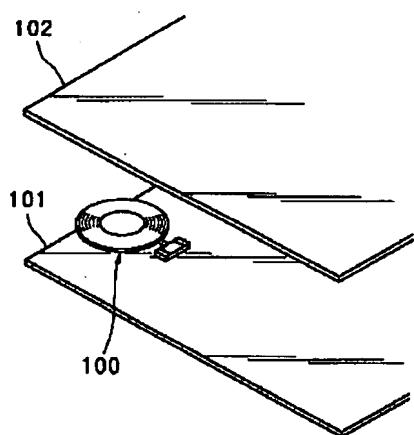


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[Translation done.]

Drawing selection  drawing 4

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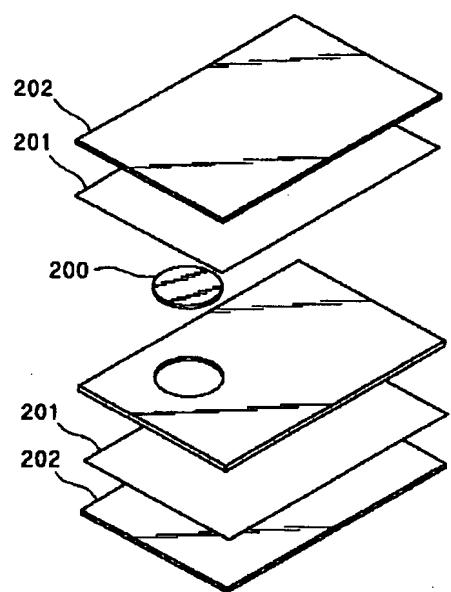


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[Translation done.]

Drawing selection  drawing 5

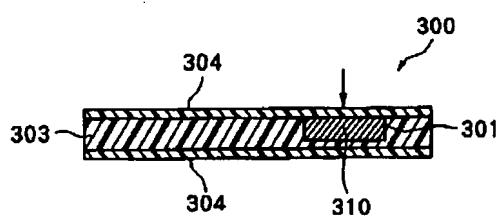
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[Translation done.]

Drawing selection drawing 6 

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[Translation done.]